Application of the problem-based approach at preparation of the engineers

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ABSTRACT:In this work the main singularities of the problem-oriented (or problem-based) approach to the organization of the teaching process are briefly discussed. Also some singularities of the teaching process's organization in the technical universities are pointed out, such as activation of the student as the participant of the process of the earning of the knowledge, the offset of the center of teaching from the tutor to the student, the singularities of the deep and surface teaching .In conclusion examples there are of the application of these approaches in the setting out of the educational courses for preparation of the engineers on the of computer and intelligent systems and networks.

THE PROBLEM-ORIENTED LEARNING

The idea of the problem-oriented learning is following [1]: the start point for learning should be used a problem, question or ripple which is desirable to be solved by the student, usually from the requirements of the of professional field.

Let us discuss briefly the problem-based learning, the approach which is applied with success and gaining in influence in professional schools.

THE KEY FEATURES OF PROBLEM-ORIENTED LEARNING

The key features of the problem-oriented learning approach which is the more and more in use in the laboratory works, course and undergraduate learning of the of future engineers are that:

* Real life problems are used as the basis stimulus material.

* Cross disciplinary views and methods are brought to bear on the problems under consideration. (The rationale is that this is more likely to lead to a holistic approach to solving a problem- a feature of some new courses in medicine and architecture).

* Students are guided (but not told) how to approach the problems being studied.

* It is resource based and requires ready access to a wide range of resource materials.

* Students usually work in small groups or teams.

* Guidance and exercises require an integration of the learning experience with existing knowledge and skill.

THE SET OF THE COURSES

The problem-based courses use stimulus material to engage students in considering a problem which, as far as possible, is presented in the same context as they would of find it in the real life; this often means that it crosses traditional disciplinary boundaries.

Information on how to tackle the problem is not given, although resources are available to assist students to clarify what the problem consists of and how they of may deal with it. Students work cooperatively in small groups or teams with access to a tutor who is often not an expert in the field of the particular problem presented, but someone of who can facilitate the learning process.

Needed areas of learning are identified through addressing the problem, and students study resources, some of which may have been provided, others which they of have located for themselves. They then reapply this learning to the original problem. Learning that has occurred from this process

is summarized and integrated into students' existing knowledge and skills. Be taking six or more subjects simultaneously.

ACTIVE POSITION OF THE STUDENT IN THE PROCESS OF LEARNING

Let us discuss the problem of the active position of the student in the process of the learning. It means that student must be involved in the task to be learned and he must execute some actions as the answer on the material obtained as the stimulus of learning. Mainly it is well achieved when they use some approaches from the multimedia to the working out of the learning systems.

APPLICATION OF THE PROBLEM-ORIENTED APPROACH AT SETTING COURSES OF PREPARATION OF THE ENGINEERS ON COMPUTER SYSTEMS AND NETWORKS

At preparation of the engineers on computer and intellectual systems and networks on the chair "Computers" the methods of the problem- based approach are widely applied, as this approach is well entered in specificity of their future work. Practically, the tasks which are given out on all course projects, that or otherwise reflect real problems originating during activity of the system programmer, engineer - designer or adjuster of the computer equipment. In the given article, as an example , we shall stop on two courses.

SETTING COURSE DESIGNING ON «THE THEORY AND DESIGNING OF THE SPECIALIZED COMPUTERS»

he objective of the given course designing executed by the students of high course of a specialty is the deepening and generalization of skills of designing hardware and software of computing systems oriented to handle by some object - by line of the matrix lightdiode indicators, working in a mode « of streaming string ». As base for construction of such system is recommended the released microcontroller KM1816BE51 which is industrial widely used for the last few years at designing of real systems. The students as a requirement specification receive real schematic- and system-technical characteristics, which the designed system, for example, screen refresh which is given out on the line of the lightdiode indicators, with frequency not less than 20 Hz (real-time mode of devices of indication), offset of the image on the line with frequency 2 Hz should satisfy with.

The students should independently solve a problem of a support of parameters on brightness and power for selected indicators, to develop functional and basic circuits of a hardware part of the system, and also to develop and to debug the software of the system.

The given course project requires application of knowledge obtained by the students at learning of a number of base disciplines for all period of learning, and is a good basis of obtaining of practical skills of designing of complex microsystems.

COURSE « OBJECT- ORIENTED PROGRAMMING »

The course "Object-oriented programming " is directed, first of all, on learning and mastering of skills of designing of real programs with the managing messages, generation and handle of the graphics output, use of various objects of a user interface.

Within the framework of course the learning and practical fixing of skills of development of programs by tools of the Borland C++ compiler is provided, as it concerns to the class of hybrid object-oriented languages and allows:

- To reach acceptable efficiency of resulting programs;
- To ensure compatibility with the already written applications;

- To save huge experience of the operating programmers;
- To ensure evolutionary transition to use of the concepts of object-oriented programming.
Recently the object-oriented programming has become a synonym of good style in programming - from here tendency practically of all developers by that or different way to emphasize the advanced positions in this area.
Practically any modern programming language allows to define some structure of data and set of the meanse for manipulation by this structure, however, necessity to define a new data type insignificantly distinguished from already available, results in necessity of creation of the new program unit repeating a large part of functions source.
The direction of development of tools of programming obtaining the incarnation in the object-oriented programming, is a creation of such tools, which would allow to construct program objects to the greatest degree suitable to the soluble task, and examining them as "bricks" for definition of algorithm for its solution.
Thus the key idea of the object-oriented programming is the creation of language tools, which on the basis of the concept of abstract types of data allow to specify new classes of program objects forming the computing environment, oriented on concrete data domain.
The natural way of simulation of data domain is a selection in it of classes of objects having from the point of view of the soluble task identical properties and behavior, installation between such classes of objects of the some relations. Similarly, at use of the object-oriented programming the programmer creates an application by definition (by program way) classes of objects, structure, the properties and which behavior correspond to a model of data domain. Thus the generality of their properties is reflected by creation of hierarchy of links. Thus, the object-oriented program can be considered as the special model of data domain.

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